

## **EXHIBIT 5**

Expert Report of James E. Yurgealitis  
September 14, 2022

Viramontes v. Cook County, Illinois

I. SUMMARY:

This report contains findings, statistics and expert opinions regarding the plaintiff's allegations against Cook County, Illinois, as stated in Case # 1:21-cv-04595.

II. BACKGROUND AND QUALIFICATIONS:

I am currently self employed as a consultant and technical advisor in the field of Firearms, Forensics and their practical application in criminal cases as well as their impact and application to local State, Federal Law & Public Policy. I have been so employed since January 2013. Prior to that date I have spent the majority of my career as a Federal Law Enforcement Officer with both the United States Department of State, Bureau of Diplomatic Security (DSS) and The United States Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). I had been so employed as such since 1986. My resume and statement of qualifications, as submitted to the State's Attorney for Cook County in this matter, are included in this report as attachments "A" and "B" respectively.

III. SERVICES REQUESTED AND CONTRACTED:

I have been retained by Cook County, Illinois, State's Attorney, to render my expert opinion on the firearms related issues raised by the plaintiff(s) in this case. I am being compensated for my research, advice, preparation and testimony on their behalf at the rate of \$300/hour.

IV. OPINIONS:

My opinion or opinions as stated in this report are the result of my training, knowledge, and experience, technical and statistical research, review of the firearms regulations of Cook County

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Illinois, the State of Illinois well as the Plaintiff(s) pleadings in this case as submitted. All opinions contained herein are made pursuant to a reasonable degree of professional certainty.

During the course of my work in this case as additional research, technical or statistical materials become available or relevant they will be reviewed. As such I reserve the right to amend my report, opinion or testimony to include consideration of those materials should their relevance warrant.

V. MATERIALS REVIEWED:

I have been provided with a copies of, and have reviewed, the following materials:

1. Plaintiffs' Complaint; Case Number 1:21-cv-04595
2. Cook County Ordinance 13-O-32 (the Ordinance)

I have reviewed materials, periodicals, publications and documents in furtherance of my research, and in formulation of, my opinion(s) in this case which is attached as Exhibit C.

VI. GENERAL FIREARMS TERMINOLOGY, TYPES AND OPERATION:

In discussing modern firearms it is important to understand how they are defined under statute, how they function and the differences between types commonly found and available to the public.

As per the Illinois State Statutes a Firearm is legally defined as the following:

<https://www.ilga.gov/legislation/ilcs/documents/043000650K1.1.htm>

"Firearm" means any device, by whatever name known, which is designed to expel a projectile or projectiles by the action of an explosion, expansion of gas or escape of gas; excluding however:

1. any pneumatic gun, spring gun, paint ball gun or B-B gun which either expels a single globular projectile not exceeding .18 inch in diameter and which has a maximum muzzle velocity of less than 700 feet per second or breakable paint balls containing washable marking colors;

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2. any device used exclusively for signaling or safety and required or recommended by the United States Coast Guard or the Interstate Commerce Commission;
3. any device used exclusively for the firing of stud cartridges, explosive rivets or similar industrial ammunition; and
4. an antique firearm (other than a machine-gun) which, although designed as a weapon, the Department of State Police finds by reason of the date of its manufacture, value, design, and other characteristics is primarily a collector's item and is not likely to be used as a weapon.”

Under Federal Law, 18 U.S.C 921 (a)(3) a Firearm is defined as:

<https://www.law.cornell.edu/uscode/text/18/921>

- (A) Any weapon (including a starter gun) which will or is designed to or may readily be converted to expel a projectile by the action of an explosive; or
- (B) the frame or receiver of any such weapon; or
- (C) any firearm muffler or firearm silencer; or
- (D) any destructive device.

Such term does not include an antique firearm, as defined in Section 921 (a)(16), e.g., an antique ignition system firearm (e.g., matchlock, flintlock, percussion cap, etc.); or a firearm made in or before 1898, etc.

Modern firearms (as legally defined) operate utilizing the expanding gases generated by the rapidly burning gunpowder contained in modern ammunition. Gunpowder (or smokeless powder) is the propellant contained within metallic cartridges or shotshells utilized by modern firearms. (Diagram of a modern metallic cartridge and shotshell as illustration #1)

Once chambered or loaded in a modern firearm, and the trigger is pulled, the primer at the base of the cartridge or shotshell is struck by a firing. The primer contains a pressure sensitive explosive compound which ignites when struck. The ignition of the primer, in turn, ignites the main powder charge contained in the case of the cartridge or shotshell. The main powder charge ignites and burns rapidly in what is essentially a contained explosion. This contained explosion generates gases at enormous pressures. The generated gases push the projectile out of the mouth of the cartridge, down the barrel of the firearm and out of the firearm through the muzzle.

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More simply defined under Federal and Illinois Law a Firearm is a weapon which utilizes the gas pressure generated by the burning gunpowder (explosive) in an ammunition cartridge to propel a projectile through the barrel and out of the firearm through the muzzle.

All modern Breech loading firearms, no matter the type, operate according to a nine step process known as the “Cycle of Fire”. The Association of Firearm and Toolmark Examiners (AFTE) is a professional organization for Forensic Firearm and Toolmark Examiners which, in conjunction with the U. S. Department of Justice (USDOJ), National Institute of Justice (NIJ), has created a training program for apprentice forensic firearm and toolmark examiners. This training program has outlined the nine steps of the Cycle of Fire here:

[https://projects.nfstc.org/firearms/module08/fir\\_m08\\_t04.htm](https://projects.nfstc.org/firearms/module08/fir_m08_t04.htm)

**Step 1. Feeding:**

Feeding refers to the insertion of cartridges into the chamber; the breech bolt pushes the cartridge into final position. Typically, the incoming round slides across the bolt or breech face during this camming action. The feeding function can be manual or performed by various kinds of belts, magazines and / or clips.

**Step 2: Chambering**

Chambering is the insertion of the cartridge into the chamber. If a cartridge of the incorrect length or diameter is used or if there is foreign matter in the chamber, chambering may be obstructed, causing a malfunction. Excess oil or grease in the chamber may cause overpressure, resulting in a ruptured cartridge case and potentially serious accidents.

**Step 3: Locking**

The breech bolt mechanism locks the cartridge into position in the barrel before firing. Most quality firearms are equipped with an interrupter mechanism that disconnects the trigger from firing pin, thus making it impossible to fire until the mechanism is safely locked. This critical relationship is referred to as timing. (Blowback mechanisms involve a spring-held bolt; the mechanism is not technically locked, it is held together by spring tension and bolt inertia.) The locking principle is easily demonstrated by closing a high-velocity .30 caliber bolt-action rifle. When the bolt is turned down at the end of its forward thrust, one or more lugs rotate into machined slots or against a shoulder in the receiver. This closure is essential; if the firing pin falls on the cartridge primer before the mechanism is safely locked, an accident may occur.

**Step 4: Firing**

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When the breech is fully locked, a pull on the trigger mechanically translates to the firing pin release. In the cocked position, the firing pin has a hammer behind it with a spring forcing it towards the primer, restrained only by a sear that is engaged by the trigger. A pull on the trigger trips the sear from the engaging notch in the hammer. The hammer, actuated by a cocked spring, drives the firing pin sharply against the percussion-sensitive primer, which fires the cartridge.

**Step 5: Obturation**

Obturation occurs when powder gases under high pressure (e.g., two and one-half tons psquare inch in the .30-06 Springfield cartridge) are sealed to prevent them from jetting between primer cup and cartridge case, cartridge case and primer wall, and projectile and bore.

Cartridge cases must be sufficiently flexible to expand against the chamber wall and transmit the instantaneous powder pressure to the barrel metal that surrounds the chamber. When the chamber pressure has returned to zero, the cartridge case must also be flexible enough to release itself from the chamber wall (even though it is now pressure-form-fitted to the chamber).

Likewise, the primer cup has been pressure-held against the side of the cartridge case and depends upon the face of the breechblock for locked support during the interval of high-chamber pressure. Obturation also occurs with the projectile; bullets are made sufficiently larger than the bore diameter to extrude into the rifling grooves and seal the gases. The sharp hammer action of the instantaneous high pressure and temperature may upset the projectile base, which enhances sealing. Shotgun wads perform the sealing function in smooth bore weapons.

Additional definitions liberally used when discussing modern firearms are Semi-automatic Fire, Full Automatic fire, Select Fire, Rifling, Caliber and Gauge.

**RIFLING:**

Rifling refers to a series of grooves cut or impressed inside the barrel in a spiral pattern. The “high” portions of these patterns are called “Lands”. The “lower” portion of this pattern are called “Grooves”. When a projectile (or bullet) is fired in a “rifled” firearm it comes into contact with the lands as it leaves the chamber and begins to travel down the barrel. Because the lands are oriented in a spiral pattern the rifling imparts a spin to the projectile which improves stability and accuracy.

**CALIBER:**

Caliber is a dimensional measurement of the inside (or bore) of a rifled barrel. In the United States caliber is traditionally expressed in fractions of an inch. For example, a .22 caliber firearm is designed to chamber and fire a projectile which measures .22 inches (or slightly less than a quarter of an inch). A .50 caliber firearm chambers and fires a projectile which is approximately a half inch in diameter.

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In Europe, and the majority of other countries utilizing the metric system, caliber has historically been expressed in millimeters (mm). Therefore a 9mm firearm is designed to chamber and fire a projectile with a diameter of 9mm.

A number of firearm calibers widely manufactured have two separate caliber designations, one in inch measurements and one in metric, which are equivalent and interchangeable. For example, a rifle chambered in .308 caliber is also referred to as 7.62 x 51mm.

GAUGE:

Gauge is a dimensional measurement which is traditionally used to denote the bore of a non rifled or “smoothbore” firearm (i.e. a Shotgun). Shotguns were initially designed to fire a mass of round shot as opposed to one solid projectile and therefore a caliber designation is not readily applicable. Gauge refers to the number of lead spheres which will fit inside the bore and equal one pound. For example in a 12 gauge shotgun you can fit 12 spheres of lead, which are approximately 18.52mm or .73 inches in diameter, the total weight of which will equal one pound. If the diameter of the spheres is increased, it will require less of them to equal one pound and therefore the smaller the “gauge” the larger the dimension of the bore. The exception to this measurement system is the .410 gauge shotgun which is actually a caliber designation.

VII. TYPES OF MODERN FIREARMS:

Modern firearms as currently manufactured for civilian ownership fall into two general types. Handguns and Long Guns (or shoulder weapons).

HANDGUNS:

Handguns are generally defined as a firearm having a short stock (grip), and are designed to be held, and fired, with one hand. The term “Handgun” defines two distinct types of modern firearms, the revolver, and the semi-automatic pistol.

A revolver is a handgun designed and manufactured with a revolving cylinder to contain, chamber and feed multiple rounds of ammunition. In a modern double action revolver pulling the

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trigger rotates the cylinder bringing an unfired cartridge of ammunition in line with the barrel and firing pin. Pulling the trigger also cocks the hammer and then releases it either directly (or indirectly via a firing pin) to strike the primer of the cartridge initiating the firing sequence as stated previously. In this type of revolver the trigger must again be pulled to rotate the cylinder in order to fire another cartridge. When all cartridges have been fired the cylinder is unlocked from the frame and swings out to facilitate removal of expended cartridge casings and insertion of unfired cartridges. The cylinder is then closed and relocked within the frame and the handgun is again ready to fire when the trigger is pulled.

A pistol is a handgun designed and manufactured with the firing chamber as an integral part of the barrel and utilizes a “box” magazine to contain and feed multiple rounds of ammunition. In this type of handgun, generally, the box magazine is inserted into the firearm, the slide or bolt is pulled back and released which springs forward and feeds a cartridge into the chamber. When the trigger is pulled a firing pin or striker is released which impacts the primer of the cartridge and initiates the firing sequence of the ammunition. In most pistols a portion of the recoil or gas pressure generated by firing the cartridge is utilized to move the slide rearward, extract and eject the expended cartridge case and chamber another unfired round from the magazine. This sequence can be repeated by pulling the trigger once for each shot until the magazine capacity is exhausted. The pistol can then be reloaded by removing the empty magazine and inserting a loaded magazine.

A Single Shot Pistol refers to a handgun which has no internal magazine capacity, cannot accept a detachable magazine, and requires the operator to manually reload the firearm after each shot fired.

LONG GUNS / SHOULDER WEAPONS:

In terms of modern firearms manufacture Long Guns are generally of two distinct types, rifles and shotguns. A rifle is a firearm which is designed and intended to be fired from the shoulder. It fires a single shot through a rifled bore for each pull of the trigger. A shotgun is a firearm which is also designed and intended to be fired from the shoulder. It fires either a number of ball shot (commonly termed “buckshot” or “birdshot”) or a single projectile (commonly termed a “slug”) through a smooth (non rifled) bore for each pull of the trigger.

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RIFLES:

Historically speaking rifles are the oldest type of firearms in existence. In terms of “types” of rifle there are numerous variations. All of these variations, generally speaking, are defined and distinguished by the way they are loaded and reloaded. For example, single shot rifles fire one shot for each pull of the trigger. They have no internal or external magazine capacity and must be reloaded with a new unfired cartridge by hand for each shot. Many of these have a hinged or “break open” receiver to facilitate loading and unloading.

A Pump Action Rifle requires the operator to manually manipulate a forearm piece which is traditionally found underneath the barrel. After firing the forearm is pulled backward which unlocks the bolt, extracts and ejects the fired cartridge case. Pushing the slide forward feeds an unfired cartridge from the magazine, cocks the firearm mechanism and locks the bolt for a successive shot. Pump action rifles have been manufactured with both tubular and detachable box magazines.

Bolt action rifles require the operator to manually manipulate the bolt of the rifle. After firing the bolt is first unlocked from the chamber and then moved rearward. This action also extracts and ejects the expended cartridge case. The bolt is then moved forward which feeds an unfired cartridge from the magazine into the chamber. Once the bolt is then again locked by the operator it is ready to fire. Bolt action rifles usually have an internal fixed magazine or tubular magazine which will facilitate reloading via manipulation of the bolt until that capacity is exhausted. Bolt action rifles were generally the choice among hunters and military forces through the end of World War II.

A lever action rifle is similar to the bolt action rifle in that the operator is required to manipulate the mechanism of the firearm. A lever at the bottom of the receiver of the rifle is manipulated in and up and down motion in order to unlock the bolt and move it rearward, extract and eject the expended cartridge case, feed an unfired cartridge into the chamber and lock it. This action is required for each shot fired through the rifle. Generally speaking, lever action rifles are usually manufactured with tubular magazines which will vary in capacity depending on the caliber of the firearm.

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A semi-automatic rifle utilizes the energy generated by the firing of the cartridge to power the cycle of fire. This is accomplished by siphoning off a portion of the gases generated by firing to operate the mechanism or by utilizing the recoil generated by firing much as in a semi-automatic pistol as described previously. Once loaded the operation of this cycle of fire is not dependent on the operator to affect any portion of the process other than to pull the trigger. Semi-automatic rifles are, and have been previously, manufactured with both fixed internal magazines and a capacity to accept detachable external magazines. As such this type of rifle is capable of firing with each pull of the trigger until the supply of ammunition is exhausted. As stated previously the majority of military firearms through World War II were bolt action. The exception to this rule was the United States entering the war with the semi-automatic M1 (Garand) .30-06 caliber rifle as standard issue. The Garand had a fixed internal magazine with an eight-round capacity.

SHOTGUNS:

Modern shotguns, as stated previously in regard to rifles, are generally classified and characterized by their operating system. (i.e., the manner in which they function, are loaded, and reloaded). Additionally in the case of shotguns with multiple barrels they are defined by placement or orientation of same.

Single Shot Shotguns function similarly to the single shot rifle. They may have a hinged receiver which allows the operator to open the action at chamber area to facilitate loading and unloading of the firearm. There are also single shot models that are loaded and unloaded through a bolt action mechanism and have no additional magazine capacity.

Bolt Action shotguns are manufactured, as stated above as single shot, or with internal or detachable magazines to facilitate easier and faster reloading. They function in the same way as a bolt action rifle and require manual manipulation of the bolt by the operator to unload and reload.

Lever Action Shotguns, again function in the same fashion as a similarly designed rifle. Manual manipulation of the lever is required for successive shots.

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Pump Action Shotguns have the same general operating system as a similarly designed rifle. The “action” of the shotgun must be worked forward and back by the operator to unlock the bolt, extract and eject the expended shotgun shell, reload and relock the bolt for firing.

Semi-automatic Shotguns, as with their rifle caliber counterparts, utilize energy (either recoil or gas pressure) generated by firing ammunition to “power” the operating system of the firearm. These are manufactured with a number of different magazines, both internal and fixed, as well as external and detachable. They are capable of firing a single shot with each pull of the trigger until the supply of ammunition in the magazine is exhausted.

Break Open, Double Barrel and “Tip Up” Shotguns have a hinged receiver which facilitates access to the rear of the chamber for unloading and reloading. They are manufactured in single shot and double barrel variations. Double barrel variations are further delineated by the placement of their barrels. Side by Side Shotguns have two barrels situated next to one another in a horizontal arrangement. Over and Under Shotguns have two barrels superimposed upon one another in a vertical plane. The mechanisms in each of these allow staggered firing of each of the two barrels with a separate pull of the trigger. When the hinged action is opened the expended shotgun shell hulls can be manually extracted although more complex designs with auto ejectors perform that function when “opened” without action by the operator.

OTHER TYPES:

There are additional types and classifications of firearms not discussed at length here as they are not as numerous or popular as those discussed thus far. For example a “Drilling”, a type of weapon popular in Europe consists of a shotgun barrel and a rifle mounted to the same receiver. They are neither popular nor commonly found in the United States. Other types of firearms such as smoothbore revolvers, Short Barreled Shotguns, Short Barreled Rifles and Machineguns are regulated by ATF under the auspices of the National Firearms Act (NFA). Manufacture, transfer, and ownership of these “NFA Firearms” is subject to more stringent regulations to include registration in a Federal Database.

ASSAULT WEAPONS:

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In recent years there has been an increase in the availability of semi-automatic rifles, pistols and shotguns with features initially designed (or patterned after those designed) for a military purpose. As this fact is intrinsically relevant to this case it is important to discuss the history of the development and evolution of firearms with these features.

HISTORY:

The Merriam Webster Dictionary defines the term “Assault Rifle” as “any of various automatic or semiautomatic rifles with large capacity magazines designed for military use”. It further defines “Assault Weapon” as “any of various automatic or semiautomatic firearms.”

Although not a legal classification under Federal Law the term “Assault Rifle” generally refers to a firearm capable of both fully automatic and semi-automatic fire (essentially a select fire machine gun under the 28 U.S.C. 5845(b) of the National Firearms Act of 1934.)

It is a generally accepted premise amongst firearms experts and historians that the first “Assault Rifle” or “Assault Weapon” is the German StG 44 (Sturmgewehr Model 1944) which appeared in production form late in WWII. Earlier pre production variants included the MP 42 and MP 43 (Machinenpistol 1942 and 1943 respectively). The Germans termed the rifle “Sturmgewehr,” literally “Storm Rifle,” and a number of the features included utilization of a portion of the gas generated by the burning cartridge propellant to operate the rifle, extensive use of steel stampings in its construction, a detachable magazine, a separate pistol style grip (not integrated with the shoulder stock), a bayonet mounting lug and a threaded barrel to facilitate the attachment of a grenade launcher. It fired a cartridge that was smaller dimensionally and less “powerful” (in terms of muzzle velocity and foot pounds of energy) than the standard 8mm Mauser cartridge in use by the German Army in their issued bolt action Mauser rifles.

Following the end of the war captured StG 44’s were analyzed by the Allies and although there was reluctance to move to a smaller caliber cartridge a number of the features of the StG 44 found favor in the design of successive European, American and Eastern Bloc military rifles. Noted firearm expert and historian Jim Supica wrote in his forward to the book “Guns,”

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“Most military establishments hesitated to “downsize” the range and power of their primary rifles in the early Cold War years. The semi-auto detachable magazine concept was an obvious success and there was something to be said for full auto capability.”<sup>(1)</sup>

He further writes,

“However, the assault rifle concept wouldn’t go away. The Soviet Union accepted the lower power round idea in its fixed magazine semi-auto chambered for an intermediate power 7.62 x 39 mm round in 1945, the SKS, which saw wide distribution and production in Soviet client states.”<sup>(2)</sup>

Two years later in 1947 the USSR followed the SKS with what Supica terms,

“The quintessential assault rifle – the Kalashnikov designed AK-47.”<sup>(3)</sup>

The design of the AK-47 carried forward a number of the features introduced on the German StG 44. These features include a gas-powered operating system, use of steel stampings in its construction, a separate pistol grip, separate shoulder stock, a detachable magazine, a bayonet lug and provision for attachment of a grenade launcher. Due to the separate stock and pistol grip the AK, much like the StG 44, also utilized a barrel shroud / or at the forward third of the rifle. Some variations of the early AK-47’s (AKM) also featured a compensator at the muzzle

“...that deflected gas upward and to the right to “compensate” for the rifle’s tendency to kick up and to the right with every shot.”<sup>(4)</sup>

In the 1950’s numerous Nations sought to replace WWI and WWII vintage bolt action and semi automatic rifles with these newer and more effective designs. With the birth of the North Atlantic Treaty Organization (NATO) however utilization of Soviet Bloc AK or SKS Assault Rifles was not possible. Accordingly a number of firearms manufacturers outside the Soviet sphere of influence developed military rifles which carried forward these same features to one extent or another. Fabrique Nationale (FN) of Herstal, Belgium and Heckler Koch (HK) of Oberndorf, Germany are two noteworthy examples.

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FN developed the FN-FAL (Fusil Automatique Leger) and HK the G3 which found a ready market amongst nations that did not favor the Soviet AK type designs. Both incorporated features which, like the AK, were derived directly from the StG 44. Their designs featured some parts made from metal stampings as opposed to heavier and more expensive machined steel pieces. A separate pistol grip, shoulder stock, detachable magazine and barrel shroud followed the basic design of the StG 44. A flash hider and / or muzzle brake have appeared in production variations of both rifles. These rifles were destined from inception to become widely exported as the domestic market in both countries was relatively limited. The FN-FAL and G3 have been in production since the 1950's and both FN and HK have licensed production to numerous countries in South America, Africa and the Middle East.

By the late 1950's through the late 1960's most nations who could afford to do so had replaced early 20<sup>th</sup> century rifle designs with these newer and more effective rifles for their military forces.

In the United States progress in this arena moved at a significantly slower pace. The prevailing wisdom here was to stay away from lighter, smaller rifle calibers and cartridges as the .30-06 cartridge used in the M-1 Garand Rifle during WWII had proven to be more than successful during WWII. Their initial answer to the burgeoning move towards Assault Rifles was a variation of the basic M-1 Garand operating system, the T44, or M-14. Outwardly the M-14 retained a full length wood stock as did the Garand, however it featured a detachable magazine, select fire (both semi-automatic and fully automatic) capability as well as a flash hider. It competed directly against the FN-FAL (designated T88) in U.S. Army trials and was selected in 1957.

In the mid 1950's ArmaLite Corporation's chief engineer, Eugene Stoner, developed a number of lightweight assault rifle designs which resulted in the AR-10 in .308 caliber. Its design closely followed what was now becoming standard assault rifle design i.e., light weight (aluminum forged receivers as opposed to machined steel), separate pistol grip and shoulder stock, foregrip / barrel shroud, detachable magazine, and numerous flash hider / muzzle brake variations. ArmaLite continued to refine the basic design of the AR-10 which resulted in the AR-15.

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AR-15 was designed to chamber and fire the 5.56 x 45mm cartridge (somewhat interchangeable with .223 Remington caliber). However despite resistance to the smaller caliber and some initial reliability problems due to improper maintenance by operators the rifle was adopted as standard issue by the US Army in the mid 1960's. The production of the rifle had been licensed to Colt and initially the model designation was, as produced, AR-15. Later after a series of engineering changes the standard US military designation was changed to M-16. When first deployed as a standard issue rifle for US Military Forces the AR-15 / M-16 platform was maligned as unreliable and prone to jamming. This was due, in part, to inadequate maintenance by the operators themselves. Once the problems were addressed and rectified the rifle proved to be as reliable and accurate as the AK type rifles deployed by the North Vietnamese and Viet Cong.



Image from “The Black Rifle”, P.95. (see bibliography)

In the ensuing 40+ years both the military and civilian versions of the M16 / AR15 platform have undergone numerous modifications both cosmetic and mechanical. Again however the basic configuration, appearance, construction and operation of the internal gas operating system (as designed) has remained unchanged since its initial inception as a military weapon.

The expiration of Colt's patents expired in the late 1970's naturally spawned competition in the

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marketplace Throughout the design's lifespan many of the internal fire control components have remained unchanged and their specifications standardized industry wide. There are multiple internal parts that are completely interchangeable between military M16's manufactured in the 1960's by Colt and a AR15 type rifle produced today by any one of hundreds of U.S. manufacturers who produce either receivers or internal operating parts. For example, a Bolt Carrier manufactured in 1967 by Colt will fit, and function as designed, in a AR copy manufactured in 2017. Additionally, the overall configuration of "copycat" AR rifles remains identical to the original production design of the early 1960's The overall design configuration (two piece hinged receiver, shoulder stock in line with the chamber and barrel, placement of the magazine, external switches and other features) are identical or nearly so.

Due to their modular construction AR type rifles are easily customized to suit the owner's personal preference. The rifle receiver itself is a hinged two-piece unit and the "upper receiver" and "lower receiver" can be swapped out for other similar pieces with ease. The design also facilitates replacement of internal fire control components and assemblies. The following video illustrates this:

<https://www.youtube.com/watch?v=F00FEJZbrb0>

It is important to note the respective characteristics of the 5.56mm / .223 caliber cartridge that influenced the US Military's decision to switch over from the 7.62 x 51mm / .308 caliber round used in the preceding model M-14 rifles.

Dimensionally the 7.62 x 51mm cartridge is 71mm (2.8 inches) long overall and weighs approximately 0.9 ounces. The 5.56mm cartridge is 57mm (2.24 inches) long overall and weighs approximately 0.4 ounces. Five pounds (80 oz.) of 7.62 ammunition would consist of 89 cartridges. Five pounds of 5.56 would consist of 200 cartridges. The lighter weight and smaller dimensions of the 5.56 / .223 caliber cartridge would allow more ammunition to be carried by an

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individual combatant for an equivalent weight. The shorter overall dimensions of the 5.56 also commensurately allowed for smaller detachable magazines and / or larger capacity magazines for the same size. A 30-round magazine for a 5.56mm AR-15 rifle is smaller than a 20 round magazine for a 7.62mm M-14 rifle.



5.56 mm (L), 7.62 x 51 mm (R) <https://www.pewpewtactical.com/7-62-nato-vs-5-56-nato/>

Performance in terms of muzzle velocity was also a consideration. The 7.62x51mm cartridge has a muzzle velocity of approximately 3200 feet per second (fps). The 5.56 cartridge has approximately the same velocity (for reference a 9mm pistol cartridge has a muzzle velocity of approximately 1100 fps). 5.56mm bullets, upon contacting tissue will “yaw” (begin to rotate on it’s axis) which contributes to the creation of both temporary and permanent large wound cavities. Handgun bullets travelling at a lower velocity do not typically yaw upon contact with tissue and do not create as large of a wound cavity nor commensurate destruction of tissue. The yaw movement of a 5.56/.223 bullet can also cause it to fragment upon striking bone which contributes to additional tissue damage not immediately adjacent to the cavity itself.

Noted Wound Ballistics expert Vincent DiMaio in “Gunshot Wounds” writes,

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"As the bullet enters, the body, there 'tail splash' or backward hurling of injured tissue. This material may be ejected from the entrance. The bullet passes through the target, creating a large temporary cavity whose maximum diameter is up to 11-12.5 times the diameter of the projectile. The maximum diameter of the cavity occurs at the point at which the maximum rate of loss of kinetic energy occurs. This occurs at the point where the bullet is at maximum yaw, i.e., turned sideways (at a 90-degree angle to the path) and / or when it fragments. If fragmentation does not occur and the path is long enough, the yawing continues until the bullet rotates 180 degrees and ends up in a base-forward position. The bullet will continue traveling base first with little or no yaw as this position puts the center of mass forward.

The temporary cavity will undulate for 5-10 msec before coming to rest as a permanent track. Positive and negative pressures alternate in the wound track, with resultant sucking of foreign material and bacteria into the track from both entrance and exit. In high-velocity centerfire rifle wounds, the expanding walls of the temporary cavity are capable of doing severe damage. There is compression, stretching and shearing of the displaced tissue. Injuries to blood vessels, nerves, or organs not struck by the bullet, and a distance from the path, can occur as can fractures of bones, though, in the case of fractures, this is relatively rare. In the author's experience, fractures usually occur when the bullet perforates an intercostal space fracturing ribs above and below the bullet path."<sup>(5)</sup>

Demaio further states,

"Projectile fragmentation can amplify the effects of the temporary cavity increasing the severity of a wound. This is the reason for the effectiveness of the 5.56 x 45-mm cartridge and the M-16 rifle. For the M-193 55-gr. bullet, on the average, the yaw becomes significant at 12 cm with marked tissue disruption occurring most commonly at 15-25 cm due principally to bullet fragmentation."<sup>(6)</sup>

Because of the propensity of the 5.56mm/.223 caliber round to create significant damage upon impacting living tissue, it is not generally considered nor favored as a hunting cartridge.

Colt sought to capitalize on the military acceptance of the AR-15 / M-16 and shortly began to propose production of these rifles for sale to the civilian market. Colt submitted a sample to the Treasury Department on October 23, 1963 for approval. The difference between the military and civilian versions were removal of fully automatic capability. This modification was achieved through nine changes to the fire control system. These modifications did not change the general overall appearance, physical features or semi-automatic rate of fire of the rifle:

- “1. Removal of the automatic sear.
2. Elimination of the automatic sear hole in the lower receiver.

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3. Elimination of the automatic sear well in the lower receiver.
4. Removal of the automatic sear hook on the hammer.
5. Removal of the automatic sear trip notch from the bottom rear portion of the bolt carrier.
6. Modification of the selector to eliminate the automatic setting.
7. Elimination of the “AUTO” position identification marking on the lower receiver.
8. Mechanical restriction of selector lever movement to two positions only: SAFE and FIRE.
9. Enlargement of the front pivot pin holes in both the upper and lower receivers, and use of a larger-diameter front pivot pin.”<sup>(7)</sup>

The animation in this video illustrates the function of both semi-automatic and full automatic AR type rifles. Note that the difference between the two consists of only a few parts in the trigger control group. The same basic configuration and function of the military rifle is shared with the semi-automatic models:

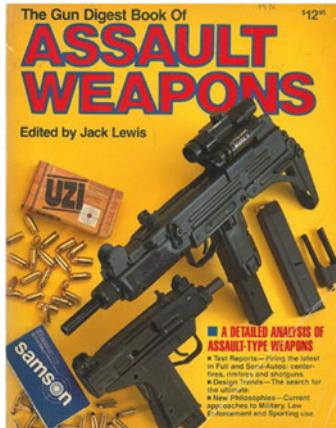
<https://www.youtube.com/watch?v=omv85cLfmxU>

The additional features on these rifles intended to enhance their capability as Military Firearms remained to include the bayonet lug and flash hider and the rifle was designated the Model R6000 Colt AR-15 SP-1 (Sporter). Treasury approved Colt’s semi-automatic version of the rifle in December 1963. In the late 1980’s – early 1990’s the term “Assault Weapon” began to see common usage in the firearm community. had already entered popular / common use (or the “lexicon” of firearms) as early as 1986 when the “Gun Digest Book of Assault Weapons” was first published. Edited by Jack Lewis the front cover states that it contains:

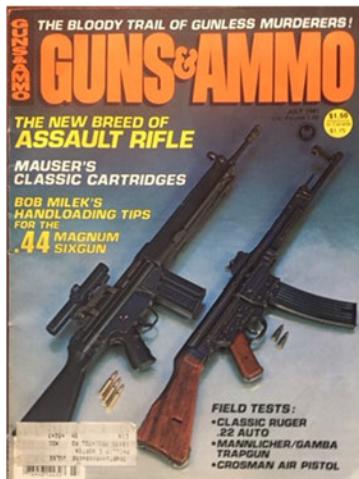
“A detailed analysis of Assault Type Weapons”

“Test Reports – Firing the latest in full and Semi Autos, centerfires, rimfires and shotguns”

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Additionally, the August 1981 issue of "Guns and Ammo" Magazine featured as its cover a photograph of a WWII era German MP44 Sturmgewehr rifle and a (then) current production Heckler Koch HK-91 semi-automatic rifle under the heading "The New Breed of Assault Rifle."



Assault Weapons have also been defined by statute at Federal, State and local levels. These particular definitions are, as in Cook County, dependent on particular features found on select fire rifles originally designed and manufactured for use on the battlefield.

PISTOL CALIBER FIREARMS:

It is important in terms of this particular case to also address the evolution and development of Firearms that chamber and fire pistol caliber ammunition. A number of the handguns that are

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banned under the The Ordinance Assault Weapons Ban are direct evolutionary descendants of sub machineguns initially designed and produced for Military use. As such they are worthy of discussion relative to this case. A sub machinegun can generally be defined as a short “Carbine Length” or compact firearm which chambers and fires pistol caliber ammunition in select fire or Fully Automatic Mode.

Many of the construction and design features attributed to assault weapons, and the STG44, were first utilized in the design and manufacture of mid-20<sup>th</sup> Century sub machineguns. Nazi Germany entered the war with the innovative MP38 (Maschinenpistole 38). It was chambered in 9mm and later, after a number of engineering changes, re designated the MP40. Design features later commonly found in assault weapons which included include an adjustable stock, separate pistol grip, a detachable magazine and use of steel stampings in its construction.

While the United States initially entered World War II with a military variant of the Thompson .45 caliber sub machinegun it was heavy and expensive to manufacture as a number of the major components were machined from solid steel. Before the end of the war the Thompson had been supplemented by the M3 “Greasegun” initially produced by General Motors. The receiver was a stamped and welded sheet metal assembly with an adjustable sliding shoulder stock. Like the MP38 / MP40 it had a separate pistol grip, a sliding / adjustable shoulder stock and a detachable box magazine with a 30-round capacity. In a utilitarian sense it was as effective as the Thompson and at approximately \$20 it was less than half as expensive for the US Government to purchase.

The United Kingdom produced over one million Sten Submachine guns during WWII. A rugged and reliable firearm made largely from welded steel stampings it was utility, reliability and ease of manufacture both combined and perfected. Features shared with the M3 and MP40 included an adjustable shoulder stock, separate detachable box magazine and, on some variations, a barrel shroud allowing the operator to utilize the area surrounding the barrel as an auxiliary grip point without contacting a heated barrel.

Prior to and during WWII a number of other nations developed sub machineguns which followed The same design and construction philosophy. Notable examples include the Soviet PPSH41, the

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Italian Beretta Model 38/42, and the Swedish Carl Gustav Model 45.

Following WWII most new sub machinegun designs continued the design philosophy which combined utility, ease of manufacture and the features of wartime firearms. In the early 1960's HK introduced the MP5 which became an immensely popular choice for military and law enforcement agencies worldwide due to its inherent reliability and accuracy. It was produced in multiple iterations to include a semi-automatic civilian version as well as a pistol variant without a provision for a shoulder stock (HK SP89). Israeli Military Industries also successfully marketed their UZI sub machinegun for export in both fully automatic / select fire, and in civilian semi-automatic variants.

Additionally, a number of sub machinegun designs proved unsuccessful in terms of Military and Government sales but nonetheless found a ready market when re engineered as a semiautomatic pistol. Notable examples include the Cobray MAC-10 (and successive variants) and the Intratec TEC-9 which began life as a Swedish designed sub machinegun, the Interdynamic MP-9.

FEATURES OF ASSAULT WEAPONS UNDER THE ORDINANCE:

Equipment designed, produced and issued to modern Military forces for utilization in the field emphasizes functionality. In terms of small arms designed and produced for military use form follows function and features are present to maximize effectiveness. Maximizing effectiveness in terms of military small arms include the ability to deliver reliable lethality or the ability to incapacitate the chosen target and provide increased survivability for the operator in battle.

Numerous Assault Weapons as defined under the Ordinance available for purchase by the public are, save the lack of select fire capability, identical copies of military firearms. As such they retain a number of features originally designed to maximize their effectiveness in combat. Other firearms available to the public, which were not initially intended for sale to government or military customers, incorporate features which mimic those found on military firearms. There are countless accessories available to add to firearms traditionally considered "sporting firearms" (i.e., those initially designed and manufactured for target shooting or hunting) which brings them

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functionality more towards the military side of the spectrum and away from the sporting side.

Specific defined features banned by The Ordinance, whether incorporated into the firearm by the manufacturer as standard equipment or subsequently added by the owner as an accessory, can generally, be considered capable of increasing their effectiveness and lethality. As such an examination of the definitions, banned features and their purpose / functionality under the legislation is relevant in addressing the points raised by the plaintiffs:

*Assault weapon means:*

- (1) A semiautomatic rifle that has the capacity to accept a large capacity magazine detachable or otherwise and one or more of the following:

Discussion of magazine capacity and / or detachable magazines will be discussed at the end of the additional features discussed below as it is common to all classes of firearms covered under the ban.

- (A) Only a pistol grip without a stock attached;

A semi-automatic rifle which includes only a pistol grip (or does not include a shoulder stock) increases the ability of the operator to conceal the firearm, maneuver the firearm in confined space and facilitates easier firing from positions other than the shoulder (firing from the hip or a point position directly in front of the operator). Rifles traditionally considered sporting firearms are generally not designed and produced as such.

- (B) Any feature capable of functioning as a protruding grip that can be held by The non-trigger hand;*

Protruding foregrips allow increased stability of the firearm by the operator. They allow the operator to better control recoil and muzzle climb thus increasing the hit probability of successive shots. It is not a feature found on traditional sporting firearms. It appeared on some versions of AK based rifles however it was not until the advent of Rail Attachment Systems (RAS) and acceptance by the US Military of same that foregrips for semi-automatic rifles have grown in popularity.

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*(C) A folding, telescoping or thumbhole stock;*

Folding and / or telescoping stocks allow the operator to more easily conceal or maneuver the rifle in a confined space. It also facilitates easier or more comfortable firing from positions other than the shoulder (as with pistol grip only rifles). US Military origins for this type of stock can be found on the M1 carbine in WWII when modified for paratrooper use. Thumbhole stocks have traditionally been utilized on firearms for sport and target shooting however during the Federal Assault Weapons Ban a number of AK style firearms (amongst others) were so equipped in order to meet the requirements during the time that the law was in effect.

*(D) A shroud attached to the barrel, or that partially or completely encircles the barrel, allowing the bearer to hold the firearm with the non-trigger hand without being burned, but excluding a slide that encloses the barrel; or*

Military semi-automatic and select fire rifles have featured a shroud or handguard that encircles the barrel since before the onset of WWII. The M1 “Garand” Rifle utilized by the US Military during that conflict incorporated a traditional wooden stock similar to most hunting and sporting rifles of the period however it also featured a wooden handguard which covered the top 2/3rds of the barrel. Therefore this design feature is not a recent development. Enclosing the barrel in a shroud serves multiple purposes. In a modern gas operated semi-automatic Military rifle it serves to protect the gas tube / piston mechanism from inadvertent damage, protects the operator from injury due to a hot barrel or other component and provides additional grip space for the operator to steady the rifle. For example, the handguard fitted to the M-16A1 as originally adopted by the US featured a rounded triangular cross section forward of the receiver. This shape was a natural fit for the non-trigger (supporting) hand.

*(E) A muzzle brake or muzzle compensator;*

The function of a muzzle brake in a semiautomatic rifle can serve a number of purposes depending on its design and placement. Escaping gases can be vented upwards at the end of the barrel to reduce “muzzle flip” and allow the operator to regain control of the rifle more rapidly after firing. As stated earlier in the case of AK style rifles a muzzle brake serves to vent gases

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directionally to counter the tendency of this rifle to move up and to the right after firing. The net advantage of less time required to recover control of the rifle after firing is that it allows the operator to more rapidly reacquire targets fire accurate additional shots if required.

*(2) A semiautomatic pistol or any semi-automatic rifle that has a fixed magazine, that has the capacity to accept more than ten rounds of ammunition;*

As stated previously magazine capacity is a common feature in all firearms subject to The Ordinance

and will be addressed following the additional features discussed below.

*(3) A semiautomatic pistol that has the capacity to accept a detachable magazine and has one or more of the following:*

*(A) Any feature capable of functioning as a protruding grip that can be held by the non-trigger hand;*

Handguns, to include semi-automatic pistols are defined in part, under federal statute 18 U.S.C. 921 (a)(29), as being “designed to be held and fired by the use of a single hand”. Secondary added grips are not found on sporting pistols manufactured in the United States or nor are they typically found on military pistols. This advantage of this type of arrangement is increased stability in controlling the pistol. Increased controllability can result in more effective shot placement by the operator as well as less time to acquire successive targets. Addition of a foregrip to a pistol would make the firearm subject to the provisions of the National Firearms Act of 1936 (NFA) as it is considered “any other weapon” under the statute.

*(B) A folding, telescoping or thumbhole stock;*

Generally, the same as 3a. to include that the addition of a stock would subject the firearms to the provisions of the NFA

*(C) A shroud attached to the barrel, or that partially or completely encircles the barrel, allowing the bearer to hold the firearm with the non-trigger hand without being burned, but excluding a slide that encloses the barrel;*

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Modern pistols wherein the design is based on either AR, AK type receivers or based on submachine gun designs (TEC-9 etc.) usually have this feature with the same derivation and resultant effect on accuracy as described under 1d.

*(D) A muzzle brake or muzzle compensator; or*

Generally, the same as stated under 1e.

*(E) The capacity to accept a detachable magazine at some location outside of the  
Pistol grip*

The placement of a detachable magazine outside of the pistol grip is a feature not common to sporting pistols and can trace its origin to military pistols designed in the late 1800's. The Bergman Military Model 1897 (or No. 5) featured a detachable magazine outside the pistol grip. Further evolution of this design can be found in the Mauser C-96 or "Broomhandle" pistols which were manufactured with fixed internal as well as detachable magazines. Modern firearms recently or currently manufactured in this configuration are either semiautomatic pistol variants of submachinegun designs (HK SP89, Czech Scorpion, TEC-9, etc.) or pistols based upon AR and AK receivers / frames. Handguns as stated previously are legally defined as one handed firearms. The modern firearms manufactured as stated previously (HK SP89 etc.) provide a second grip point due to the due to the detachable magazine forward of the pistol grip. This increases stability with a secondary attribute of allowing more controlled rapid fire.

*(4) A semiautomatic shotgun that has one or more of the following:*

*(A) Only a pistol grip without a stock attached;*

*(B) Any feature capable of functioning as a protruding grip that can be held by the non-trigger hand*

*(C) A folding, telescoping or thumbhole stock*

*(D) A fixed magazine capacity in excess of five rounds; or*

*(E) The ability to accept a detachable magazine*

The derivation and discussion of the features banned in regard to semi-automatic shotguns are the

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same as those described previously in regard to semi-automatic rifles under the statute.

*(5) Any shotgun with a revolving cylinder*

This provision refers to semi-automatic “Striker 12” or “Street Sweeper” Shotguns (as marketed in the United States) and derivations thereof. Originally a South Africa designed combat / riot control firearm the 12 Gauge shotgun is fed via a twelve round spring loaded rotary magazine. This design has not been accepted or adopted by the U.S Military or any domestic Law Enforcement use by any agency that I am aware of. In terms of legitimate sporting use for either hunting or target shooting I cannot conceive of it having any utility. A discussion of the type and a firing demonstration can be found here:

<https://www.youtube.com/watch?v=Uoy14h6K5TY&t=3s>

In 1994 the Federal Bureau of Alcohol, Tobacco and Firearms ruled that these shotguns were “not particularly suitable for sporting purposes” and reclassified them as “Destructive Devices” therefore removing them from the Gun Control Act of 1968 and regulation under the National Firearms Act.

*High-Capacity Magazines:*

Under The Ordinance “High Capacity Magazine” refers to any magazine with a capacity exceeding ten (10) rounds for both Semiautomatic Rifles and Pistols. For semiautomatic shotguns the legislation limits internal capacity to five (5) rounds. Generally speaking modern semiautomatic rifles that are designed, manufactured and marketed as “hunting rifles” traditionally have an internal magazine capacity of less than 10 rounds depending on caliber. For example, the Browning BAR in .30-06 caliber as currently manufactured has an internal magazine capacity of four (4) rounds.

High-capacity detachable magazines are not an evolutionary firearms development initially designed or intended for the civilian marketplace. The lineage of high capacity detachable

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magazines can be traced directly to a military heritage. Magazine fed light machine guns developed or deployed prior to and during WWI and thereafter refined and improved the capability and reliability of this type of feeding mechanism on a large scale.

Without argument the ability to fire an increased quantity of cartridges without reloading increases the lethality and effectiveness of small arms in combat or the military would not have incorporated this feature. The initial AR-15's manufactured by Colt for the U.S. Military in the 1960's were issued with 20 round detachable magazines. Later iterations of the AR-15 and M-16 in military service featured 30 round detachable magazines as the needs of the service dictated. In a civilian criminal mass or indiscriminate shooting the resultant effect is the same.

As stated previously form follows function in regard to equipment designed and intended for military use. The intent of the Ordinance is to prevent or reduce the potential of a mass casualty event occurring in the civilian arena through the use of what is, essentially, military hardware designed and intended for use in battle.

OPINION - ASSAULT WEAPONS FOR HUNTING AND SPORTING PURPOSES:

In my opinion, based upon my training knowledge experience and research assault rifles were not designed for traditional hunting purposes. Neither was the .223 caliber / 5.56 mm cartridge originally developed for civilian hunting applications. (It is worth noting that in Illinois, amongst other states, .223 / 5.56 is too small a caliber to be legal for hunting except for Coyotes). Hunting with AR type rifles is permissible in some states however they must be chambered in a more 'traditional' hunting caliber such as .308 Winchester. There are numerous other traditional sporting rifles (and in fact military surplus rifles such as the M1 Garand in .30-06 caliber) that are legal under The Ordinance and chambered in a caliber both legal and more suitable for hunting than .223 caliber / 5.56.mm.

OPINION - ASSAULT WEAPONS FOR HOME DEFENSE AND PERSONAL PROTECTION:

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In terms of home defense and personal protection I am of the opinion that Assault Weapons, whether in the form of a rifle or a handgun are a poor choice for either purpose. I have been asked on numerous occasions during my career what I would recommend for either or both. My recommendation is based upon my inquiry in return regarding the individual's (and their family members) personal experience and comfort level with firearms. In over 25 + years I have never recommended an AR, AK, or other similar assault weapon for home defense.

Home defense and / or Retail Robbery situations are rarely, if ever, lengthy shootouts with extensive exchanges of gunfire. I regularly review newsclips as posted on the National Rifle Association's "Armed Citizen" webpages. None of the newsclips have mentioned a situation wherein there was a protracted lengthy shootout. I am not of the opinion that an abundance of ammunition is a substitute for weapons familiarization and shot placement. Rather I believe that large capacity magazines actually facilitate excessive discharge of ammunition with a resultant risk to uninvolved individuals. Repeated practice and shooting with your chosen firearm will make you a more effective deterrent should deadly force be required.

If the individual preferred shoulder weapons, I would recommend a pump action 12-to-20-gauge shotgun (Remington 870, Mossberg 500 etc.) loaded with Buckshot and stored with the "hammer dropped" on an empty chamber, safety off. The only action required to bring the shotgun from a safe unloaded condition to a "ready to fire" condition is to work the pump action of the shotgun. The advantages of this type of firearm are undeniable stopping power, low probability of over penetration (as compared to rifle caliber and high velocity projectiles) no manipulation of safety mechanisms required in a high stress situation and the loading process itself is an audible deterrent. Training and familiarization with this type of a firearm is simple and straightforward.

In recommending a handgun my first inclination is to recommend an eight-shot revolver in .38 +P caliber / .357 Magnum (Similar to S&W Model 627, Taurus Model 608 etc.) loaded with hollow point bullets. As with my rationale for recommending a pump action shotgun there are no complicated safety mechanisms to manipulate in a high stress situation, low probability of over penetration and ease of reloading with a speedloader should more than eight shots be required.

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Revolvers are also easier and less complicated for other family members to learn to operate especially if they have less familiarity with firearms.

In terms of a carry handgun I value concealability over ammunition capacity. The advantage of concealed carry is protection without broadcasting the fact. In a street robbery scenario, I believe the best course of action is to quickly extricate yourself from the “kill zone” and not engage in a protracted gunfight. When I was employed as a Special Agent with ATF we were issued a Sig Sauer P229 in .40 S&W caliber as a primary duty weapon. We were also given the choice of a Sig Sauer P239 in .40 S&W or a five shot Smith and Wesson Model 640 in .357 Magnum as a backup firearm. When off duty I carried the S&W 640 and a speedloader extensively as opposed to the P229. I found it easy to conceal and am of the opinion that ten (10) rounds was an adequate amount of ammunition to extricate myself from a street or retail location robbery should I encounter one. Consequently, I have most often recommended either a lightweight small revolver (S&W Bodyguard, Ruger LCR, Smith and Wesson Model 36, 640 or variant) carried with a speedloader or a low profile small semiautomatic pistol (Ruger LCP, Colt Pocketlite etc.) with a spare magazine.

Essentially the types of firearms classified as Assault Weapons under the County Ordinance, specifically AR and AK type rifles, are direct developmental descendants of Military weapons designed for use in combat. The ‘civilian’ AR-15 type retains in 5.56mm retains the same performance characteristics (in terms of muzzle velocity, range etc.) as does the Military M-16 and its variants (M-16A2, M-4 etc.).

According to the US Army Manual 3-22.9 “Rifle Marksmanship M-16A1, M-16A2/3, M-16A4, and M4 Carbine, April 2003” the maximum range of these rifles is 2650-3000 meters. They were not designed, nor particularly suitable, for home defense in short range close quarter situations.

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FM 3-22.9(FM 23-9)

**CHAPTER 2**  
**CHARACTERISTICS, AMMUNITION, AND**  
**ACCESSORIES**

*This chapter describes the general components, characteristics, ammunition, and accessories for the M16- and M4-series weapons to include a brief explanation of how to mount the various accessories.*

**2-1. CHARACTERISTICS**

The M16-/M4-series weapons are 5.56-mm, magazine-fed, gas-operated, air-cooled, shoulder-fired weapons. This section describes the general characteristics (Table 2-1) and the components of the M16-/M4-series weapons. Table 2-2 (page 2-2) shows the characteristics of various accessories.

CHARACTERISTIC	M16A1	M16A2/A3	M16A4	M4
<b>WEIGHT (pounds):</b>				
Without magazine and sling	6.35	7.78	9.08	6.49
With sling and loaded:				
20-round magazine	6.75	8.48	9.78	7.19
30-round magazine	7.06	8.79	10.09	7.50
Bayonet knife, M9	1.50	1.50	1.50	1.50
Scabbard	0.30	0.30	0.30	0.30
Sling, M1	0.40	0.40	0.40	0.40
<b>LENGTH (inches):</b>				
Rifle w/bayonet knife	44.25	44.88	44.88	N/A
Overall rifle length	30.00	39.63	39.63	N/A
Buttstock closed	N/A	N/A	N/A	29.75
Buttstock open	N/A	N/A	N/A	33.0
<b>OPERATIONAL CHARACTERISTICS:</b>				
Barrel rifling-right hand 1 twist (inches)	12	7	7	7
Muzzle velocity (feet per second)	3,250	3,100	3,100	2,970
Cyclic rate of fire (rounds per minute)	700-800	700-900	800	700-900
<b>MAXIMUM EFFECTIVE RATE OF FIRE:</b>				
Semiautomatic (rounds per minute)	45-65	45	45	45
Burst (3-round bursts) (rounds per minute)	N/A	90	90	90
Automatic (rounds per minute)	150-200	150-200 A3	N/A	N/A
Sustained (rounds per minute)	12-15	12-15	12-15	12-15
<b>RANGE (meters):</b>				
Maximum range	2,653	3,600	3,600	3,600
Maximum effective range				
Point target	460	550	550	500
Area target	N/A	800	600	600

Table 2-1. Characteristics of the M16-/M4-series weapons.

**NOTE:** For further technical information, refer to TM 9-1005-319-10 and TM 9-1005-249-10.

2-1

Essentially the problem with use of AK or AR type in this capacity is one of overpenetration of common household construction materials. Common bullet weights for .223 / 5.56mm caliber projectiles are 50 to 62 grains + or - (0.11 to 0.14 ounces) and common muzzle velocities are approximately 3,200 to 3,500 feet per second. A heavier bullet and increased velocity equates to more of the cartridge's energy being transferred to the target. The National Rifle Association (NRA) American Rifleman Magazine tested the U.S. Army's new .223 caliber cartridge (M855A1) in 2014 and the results are published here:

<https://www.americanrifleman.org/articles/2014/5/21/testing-the-army-s-m855a1-standard-ball-cartridge/>

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The article states that M855A1 ammunition, which is readily available to the public, is capable of penetrating a concrete block at 20-40 yards (dependent on rifle barrel length) and 3/8 inch steel plate at 300 yards. According to the article:

“the new bullet was also tested according to FBI criteria against those prescribed barriers, including sheet steel and automobile glass. Not only did the M855A1 breach them, but it continued on into ballistic gelatin with sufficient weight and velocity to have inflicted serious or lethal wounds.”

This online video illustrates the capability of commonly available .223 / 5.56mm caliber ammunition to penetrate Level III body armor. The author / narrator states that this test was performed at a distance of “about seven yards”:

<https://www.youtube.com/watch?v=oMYkEMhPsO8>

For reference here is the Remington Factory ballistics chart for their commercial .223 offerings:

PREMIER® ACCUTIP CALIBERS & BALLISTICS										R		
CALIBER	INDEX / EDI NO.	WEIGHT (GR)	BULLET STYLE	PRIMER NO.	BALLISTIC COEFFICIENT	MUZZLE	VELOCITY (FT-PS)			200	300	400
							100	200	300			
17 Remington FireBall®	PRA17FB	20	AccuTip-V™	7 1/2	0.185	4000	3380	2840	2360	1930		
17 Remington	PRA17RA	20	AccuTip-V™	7 1/2	0.185	4250	3594	3028	2529	2081		
204 Ruger	PRA204A	32	AccuTip-V™	7 1/2	0.21	4225	3632	3114	2652	2234		
	PRA204B	40	AccuTip-V™ Boat Tail	7 1/2	0.275	3900	3451	3046	2677	2336		
22 Hornet	PRA22HNA	35	AccuTip-V™	6 1/2	0.109	3100	2271	1591	1127	924		
221 Remington Fireball	PRA221FB	50	AccuTip-V™ Boat Tail	7 1/2	0.238	2995	2605	2247	1918	1622		
222 Remington	PRA222RB	50	AccuTip-V™ Boat Tail	7 1/2	0.242	3140	2744	2380	2045	1740		
223 Remington	PRA223RB	50	AccuTip-V™ Boat Tail	7 1/2	0.242	3410	2989	2605	2252	1928		
	PRA223RC	55	AccuTip-V™	7 1/2	0.255	3240	2854	2500	2172	1871		

<https://images.remington-catalog.com/568993448fdb4>

OPINION – ASSAULT WEAPONS AS A GENERAL THREAT TO PUBLIC SAFETY:

As mentioned previously in this report many of the firearms covered by the Ordinance can directly trace their origins to those developed for use in combat. As such they were never initially intended for general distribution / sale to the public.

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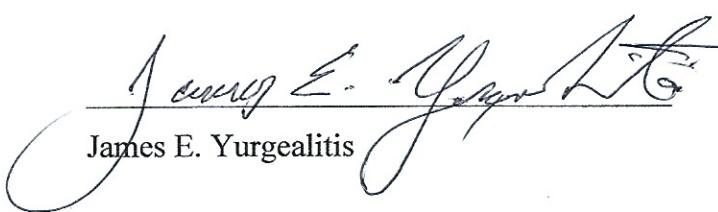
As tragically demonstrated by recent mass shootings such as the Pulse Nightclub in Orlando Florida in 2016 (49 fatalities, 50+ wounded), the 2017 Las Vegas shooting (60 fatalities, 400+ wounded), the 2022 Uvalde Texas School shooting (21 fatalities + 17 wounded) and the July 4<sup>th</sup> 2022 shooting in Highland Park (7 fatalities + 48 wounded), the Assault Weapons (in conjunction with high capacity magazines) as defined under the Ordinance are capable of inflicting significant carnage upon civilians in a short period of time.

Additionally rifle caliber Assault Weapons as prohibited under the Ordinance pose a significant risk to Law Enforcement Officers. It has been my experience that soft body armor issued to most Uniformed Officers has a “Level II” or “Level IIIA” National Institute of Justice (NIJ) protection rating. These two ratings are suitable for protection against most handgun bullets as those projectiles range up to a 1200FPS (+ or -) velocity. Rifle caliber Assault Weapons (AR & AK type) can, as stated previously in this report, achieve muzzle velocities of 3200FPS (+ or -) which can readily penetrate Level II & IIIA Body Armor (as well as some Level III hard body armor which is not universal standard issue amongst Law Enforcement Agencies nationwide). Not only do the firearms banned under the Ordinance pose a threat to overall public safety they increase the likelihood that first responders charged with stopping such a threat may be injured or killed in the performance of their duty.

Pursuant to 28 USC §1746. I declare under penalty of perjury that the foregoing is true and correct.

Executed on 09/14, 2022

James E. YURGEALITIS  
(printed name)

  
James E. Yurgealitis

## James E. Yurgealitis

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Email: jyurgealitis@gmail.com

### SUMMARY:

Self employed as a Legal and Public Policy Consultant providing Technical Firearms and Forensic Consulting, Testing and Policy Research / Training Services to Corporations, Legal Counsel and the Public Sector

### EDUCATION:

B.A., Political Science and Psychology, St. John Fisher College, Rochester, New York – May 1985

### PROFESSIONAL EXPERIENCE:

December 2012 to Present: Independent Legal and Policy Consultant / Subject Matter Expert

Currently provide independent consulting services to Corporations, Legal Counsel and Governmental entities in regard to Public Policy and Technical matters relating to Firearms, Firearms Policy, Forensics and Law Enforcement. Current and former clients include the Office of the District Attorney for Cook County Illinois, The City of Sunnyvale, California, The City of Highland Park, Illinois, The Office of the Attorney General for the Commonwealth of Massachusetts and the Center for American Progress, Washington D.C. I have provided sound policy and technical assistance for my clients to include expert testimony which successfully endured the opposition's legal appeals to the U.S. Circuit Court of Appeals and the U.S. Supreme Court.

December 2003 to December 2012: Senior Special Agent / Program Manager for Forensic Services ATF National Laboratory Center (NLC), Beltsville, Maryland. U. S Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)

Directed the administration and management of ATF's Forensic Training Programs to include the National Firearms Examiner Academy (NFEA) a 12-month training program for State and Local Forensic Firearm Examiner Trainees. Also managed two additional forensic training programs. Administered a \$1M + budget in accordance with strict ATF and National Institute of Justice (NIJ) guidelines and reporting requirements. Responsible for oversight of all Forensic Firearms related research at the NLC. Supervised a full and part time cadre of fifty-two (52) instructors and administrative personnel. Maintained liaison with commercial firearms and ammunition manufacturers and subject matter experts and ensure that lesson plans and curriculum reflected the latest technical developments in firearms manufacture, forensics and their application to federal and state law. Applied for, received and managed in excess of \$2M in external grants to facilitate uninterrupted delivery of training during internal budget shortfalls. Detailed to the Department of Homeland Security Command Center in 2005 with overall responsibility to coordinate and direct Federal, State and Local Law Enforcement assets during and following Hurricanes "Irene" and "Katrina" and again in 2010 for "Andrew" and "Danielle".

June 1997 - December 2003: Special Agent / Violent Crime Coordinator, ATF Baltimore Field Division, Baltimore, Maryland

Responsible for management of ATF's "Project Disarm", a joint law enforcement initiative between ATF, The United States Attorney's office for the District of Maryland (USAO), the Baltimore City Police Department, the Baltimore City States Attorney's Office and the Maryland State Police. Duties included reviewing over 400 state and local firearms related arrests annually for subsequent referral to the USAO and Federal Prosecution. Managed a caseload of 75 – 100 criminal cases annually. Responsible for selection, referral, follow - up investigation and subsequent indictment and prosecution of armed career criminals. Testified in front of Federal Grand Juries in excess of 75 times annually. Was recognized, and testified, as an expert witness in the Identification, Operability and origin of Firearms and Ammunition in three Federal Judicial Districts. Toured over 25 firearms and ammunition manufacturing facilities in Europe and the United States. Temporarily assigned in 2001 for three months to the 9-11 Task Force investigation in conjunction with FBI Assets. Temporarily assigned to the D.C. Sniper Task Force Intelligence Group in 2002 for two months.

June 1990 – June 1997:

Special Agent, ATF Baltimore Field Division, Baltimore, Maryland

Served in various capacities as a street-level Special Agent. Acted as Group Supervisor and Assistant Special Agent in Charge on numerous occasions. Served on the Washington – Baltimore High Intensity Drug Trafficking Area (HIDTA) task force from 1995 – 1999. Investigated armed narcotics trafficking organizations, seized assets, authored and executed Federal and state search and arrest warrants, conducted surveillance, interviews / interrogations, testified in Federal and state courts as a fact witness, purchased firearms, explosives and narcotics while in an undercover capacity, investigated fatal bombings and arsons, firearms trafficking, alcohol and tobacco trafficking, homicide, fraud and gun store burglaries. Also while detailed for 8 months as the Public Information Officer authored press releases, provided interviews to local and national print and television media outlets and made presentations to local and national public and special interest groups and associations.

April 1989 – June 1990 and July 1986 – March 1987: Special Agent, United States Department of State, Diplomatic Security Service (DSS), Washington Field Office, Rosslyn, VA

Conducted investigations of violations of Federal Law under the department's purview to include Passport and Visa Fraud, Illegal trafficking of restricted firearms and war materials to prohibited countries, human trafficking, seized assets, authored and executed State, local and Federal Arrest and Search Warrants, testified in Federal Court as a fact witness, detailed on an as needed basis to the Dignitary Protection Division as Agent in Charge of multiple protective details for visiting and resident foreign dignitaries, temporarily assigned to support Physical and Personal Protective Security in various U.S. Embassies overseas on an as needed basis, detailed to the Secretary of State Protective Division on an as needed basis to supervise agents assigned to augment the permanent protective detail.

March 1987-February 1989: Special Agent, DSS, Secretary of State Protective Division, Washington, DC

Served in various capacities as Acting Agent in Charge, Acting Shift Leader, Lead Advance Agent and Shift Agent. Responsibilities included close personal protection of the Secretary of State both domestically and overseas, extensive foreign travel to facilitate and prepare security arrangements for overseas visits to include Presidential Summit meetings, liaison with foreign host government officials to plan and solicit assistance with security arrangements, supervision of agents temporarily assigned to augment the detail, liaison with U.S Government Intelligence Agencies and other Federal, State and Local Law Enforcement Agencies to identify and protect against potential threats to the Secretary of State.

CLEARANCES: Top Secret March 1986 valid through February 2015. Numerous prior SCI Clearances.

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TEACHING EXPERIENCE:

- Instructed at the Federal Law Enforcement Training Center (FLETC), for ATF and other Federal Law Enforcement Agencies
- Instructed at the International Law Enforcement Academy (ILEA) in Budapest, Hungary
- Instructed for numerous State, local and / or regional law enforcement agencies both in the United States, Canada and Central America

LINKEDIN PROFILE AND ENDORSEMENTS:

[https://www.linkedin.com/in/james-jim-yurgealitis-68618464?trk=nav\\_responsive\\_tab\\_profile\\_pic](https://www.linkedin.com/in/james-jim-yurgealitis-68618464?trk=nav_responsive_tab_profile_pic)

REFERENCES:

Available upon request

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**Professional Qualifications of James E. Yurgealitis  
Independent Legal and Forensic Consultant**

I, James E. Yurgealitis, being duly sworn, depose and state:

- 1.) That I was previously employed as a Senior Special Agent / Program Manager with the Bureau of Alcohol, Tobacco Firearms & Explosives, (ATF) United States Department of Justice, and had been so employed since 1990. Prior to 1990 I was employed as a Special Agent with the Bureau of Diplomatic Security, (DSS) United States Department of State and had been so employed since 1986.
- 2.) I have a Bachelor of Arts Degree in Political Science and Psychology from St. John Fisher College, Rochester, New York.
- 3.) I am a graduate of the Federal Law Enforcement Training Center, Glynco, Georgia, the Criminal Investigator Training Program, Bureau of Diplomatic Security New Agent Training, and the Bureau of ATF New Agent Training Program.
- 4.) I have completed the Firearms Interstate Nexus Training Program conducted by the Firearms Technology Branch, ATF Headquarters, Washington, D.C.
- 5.) I have completed both Advanced Interstate and European Nexus Training conducted by ATF in conjunction with several domestic and European firearm manufacturers.
- 6.) I have testified in excess of 200 times before Federal Grand Juries regarding the classification, operability, and commerce of firearms and / or ammunition.
- 7.) I have previously qualified as an expert witness regarding the origin, operability / classification and interstate movement of firearms and ammunition in U.S. District Court for the District of Maryland, U.S. District Court for the District of Delaware and the Circuit Court For Baltimore City, Maryland.
- 8.) I have conducted regular training for local, state and federal law enforcement agencies both domestically and overseas regarding firearms classification, operability and firearms statutes.
- 9.) I maintain a personal library of books, printed material and documents that relate to the field of firearms, ammunition, and firearms classification, attend local and national trade shows and professional association meetings, and regularly review periodicals relating to firearms and ammunition.
- 10.) I attend trade shows, maintain contact with, and regularly consult with other persons, to include published authors and recognized experts in the origin, identification and classification of firearms and ammunition.

11.) I have, during my tenure with ATF, personally examined in excess of five thousand  
Qualifications Of James E. Yurgealitis contd.

firearms to determine their origin and classification and operability, and to facilitate the tracing of those firearms.

I have toured production facilities for numerous firearms and ammunition manufacturers. The tours were conducted by corporate historians, corporate officers, or production engineering personnel.

Domestic Firearm Manufacturers:

Bushmaster Firearms, Ilion, NY, USA  
Colt, New Haven CT, USA (4x)  
H&R 1871 Inc., Chicopee, MA, USA (2x)  
Marlin, North Haven CT, USA (4x)  
O.F. Mossberg & Sons, North Haven, CT, USA (4x)  
Remington Firearms, Ilion, NY, USA  
Savage Arms Inc., Westfield, MA, USA (4x)  
Sig-Sauer / SIGARMS Inc., Exeter, NH, USA (3x)  
Smith and Wesson, Springfield, MA, USA (4x)  
Sturm Ruger, Newport, NH, USA (4x)  
Yankee Hill Machining, Florence, MA, USA

Foreign Firearm Manufacturers:

Carl Walther GmbH, Ulm, Germany  
Ceska Zbrojovka (CZ), Uhersky Brod, Czech Republic  
Fegarmy (FEG), Budapest, Hungary  
F.N Herstal S.A., Herstal, Belgium  
Glock GmbH, Deutsch-Wagram, Austria  
Heckler & Koch GmbH, Oberndorf au Neckar, Germany  
J.P. Sauer & Sohn GmbH, Eckernforde, Germany

Domestic Ammunition Manufacturers:

Fiocchi Ammunition, Ozark, MO, USA  
PMC, Boulder City, NV, USA  
Remington, Lonoke, AR, USA (4x)  
Sierra, Sedalia, MO, USA  
Starline Brass, Sedalia, MO, USA

European Proof Houses

Beschussamt Ulm, (Ulm Proofhouse) Ulm, Germany  
Beschusstelle Eckernforde, (Eckernforde Proofhouse) Eckernforde, Germany  
Czech Republic Proofhouse, Uhersky Brod, Czech Republic  
Liege Proofhouse, Liege, Belgium

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Qualifications Of James E. Yurgealitis contd.

I have been allowed regular access to the following reference collections:

Bureau of Alcohol, Tobacco Firearms and Explosives Reference Collection, Martinsburg, West Virginia, USA consisting of 5,000+ firearms

Liege Proofhouse, Liege, Belgium consisting of 1,000+ ammunition cartridges

Springfield Armory National Historic Site Firearms Collection, Springfield, MA, USA consisting of 10,000+ Firearms

Smithsonian Institution (Museum of American History) Firearms Reference Collection Washington, DC, USA, consisting of 4000+ firearms

Wertechnische Studiensammlung des BWB, (Federal Defense Procurement Bureau Museum) Koblenz, Germany consisting of 10,000+ Firearms

I have toured the following museums:

Heeresgeschichtliches Museum, (Museum of Military History), Vienna, Austria

Hungarian Military Museum, Budapest, Hungary

Springfield Armory National Historic Site, Springfield, MA, USA

United States Air Force Museum, Dayton, OH, USA

United States Army Ordnance Museum, Aberdeen Proving Ground, Aberdeen, MD, USA

United States Military Academy Museum, West Point, NY, USA

United States Naval Academy Museum, Annapolis, MD, USA

Wertechnische Studiensammlung des BWB, (Federal Defense Procurement Bureau Museum) Koblenz, Germany

Membership in Professional Organizations:

Member, International Ammunition Association (IAA)

Technical Advisor (pending approval), Association of Firearm and Toolmark Examiners (AFTE)

Member, Federal Law Enforcement Officers Association (FLEOA)

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James E. Yurgealitis: List of Criminal and Civil Cases Worked 2012 – 2022

1. State of Maryland v. Smith, Linwood T, Circuit Court for Baltimore County, Maryland Case No. 03-K-12-004002
2. Freidman v. City of Highland Park, Illinois, United States District Court, District of Illinois, Case No. 1:13-cv-9073
3. Wilson v. County of Cook, Illinois, Illinois Supreme Court, Case No. 2012 IL 112026
4. Fyock v. The City of Sunnyvale, California, United States District Court, Northern District of California, Case No. 13-cv-05807 RMW
5. Wrenn v. District of Columbia, United States District Court, District of Columbia, Civil Action Case No. 15-162 CKK
6. Worman v. Healey, United States District Court for the District of Massachusetts, Case No. 1:17-cv-10107
7. Buckeye Firearms v. City of Cincinnati, Hamilton County, Ohio Court of Common Pleas, Case No. A1803098
8. Powell v. The State of Illinois, United States District Court for the Northern District of Illinois, Case No. 18-cv-6675
9. Fletcher v. Century Arms, Circuit Court of the 15<sup>th</sup> Judicial District, in and for Palm Beach County, Florida, Case No. 502018CA009715
10. Pullman Arms v. Healey, United States District Court for the District of Massachusetts, Case No. 4:16-40136-TSH
11. United States v. Richard Cooke, United States District Court for the Western District of New York, Case No. 17-CR-0038
12. Long v. Gamo Outdoor U.S.A. Inc., District Court for Clark County, Nevada, Case No. A-16-748401-C

Report of James E. Yurgealitis, September 14, 2022 Contd.

EXHIBIT "C"

BIBLIOGRAPHY& FOOTNOTES

Books in Print:

Barnes, Frank C., *Cartridges of the World, 9<sup>th</sup> Edition*, Krause Publications, Iola, WI, 2000

Bartocci, Christopher R., *The Black Rifle II*, Collector Grade Publications Inc., Coburg, Ontario, Canada, 2004

Davies, Paul J., *U.S. Guns of World War II*, Thomas Publications, Gettysburg, PA, 2004

DiMaio, Vincent J.M., *Gunshot Wounds, Second Edition*, CRC Press, New York, NY, 1999

Ezell, Edward C., *Kalashnikov, The Arms and the Man*, Collector Grade Publications, Coburg, Ontario, Canada, 2001

Ezell, Edward C. & Stevens, Blake R., *The Black Rifle*, Collector Grade Publications, Coburg, Ontario, Canada, 2004

Hogg, Ian V. & Weeks, John S., *Military Small Arms of the 20<sup>th</sup> Century, 7<sup>th</sup> Edition*, Krause Publications, Iola, WI, 2000

Kersten, Mandfred and Schmid, Walter. *Heckler and Koch, The Official History of the Oberndorf Company of Heckler and Koch*, Heckler and Koch GmbH, Oberndorf, Germany, 2001

Lewis, Jack, *The Gun Digest Book of Assault Weapons*, DBI Books, Northbrook, IL, 1986

Moyer, SGM Frank A., *Special Forces Foreign Weapons Handbook*, Citadel, NJ, 1983

Musgrave, Daniel D. & Nelson, Thomas B., *The World's Assault Rifles and Automatic Carbines*, T.B.N. Enterprises, Alexandria, VA, undated.

Poyer, Joe, *The AK-47 and AK-74 Kalashnikov Rifles and Their Variations*, North Cape Publications, Tustin, CA, 2004

Poyer, Joe, *The M16 / AR15 Rifle, A Shooter's and Collector's Guide, 2<sup>nd</sup> Edition*, North Cape Publications, Tustin, CA, 2003

Skennerton, Ian. *British Small Arms of World War 2*, Greenhill, London, UK, 1988

Supica, Jim, (Introduction), *Guns*, Taj Books, Cobham, Surrey, UK, 2005

Wilson, R.L., *Colt an American Legend*, Abbeville Publishing Group, New York, NY, 1985

Internet Resources not directly cited in Report:

U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives website: [www.atf.gov](http://www.atf.gov)

Report of James E. Yurgealitis, September 14, 2022 Contd.

Footnotes:

1. Supica, Jim, (Introduction), *Guns*, p. 28
2. Ibid.
3. Ibid
4. Poyer, Joe, *The AK-47 and AK-74 Kalashnikov Rifles and Their Variations*, p.90
5. DiMaio, Vincent J.M., *Gunshot Wounds*, pp. 54-55
6. Ibid, p.56
7. Bartocci, Christopher R., *The Black Rifle II*, p. 234